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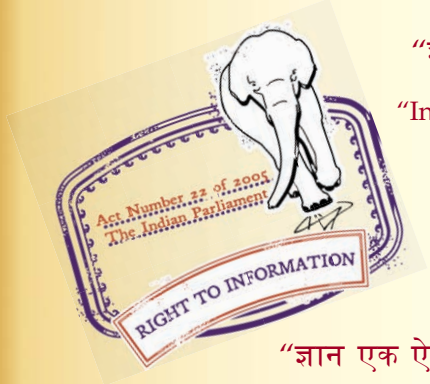
IS 10010 (1981): Method for evaluation of strength and shade of pigment dispersion by printing method [TXD 7: Textile Sizing and Finishing Materials]



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IS : 10010 - 1981

Indian Standard

METHOD FOR EVALUATION OF STRENGTH AND SHADE OF PIGMENT DISPERSION BY PRINTING METHOD

UDC 677·027 523 14 : 677·016·4

INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

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AMENDMENT NO. 1 MARCH 1983

TO

IS:10010-1981 METHOD FOR EVALUATION OF STRENGTH AND SHADE OF PIGMENT DISPERSION BY PRINTING METHOD

Corrigenda

(*Page 4, clause 5.1, last line*) - Substitute 'either side' *for* 'either'.

(*Page 6, clause A-1.4, heading*) - Substitute the following for the existing heading:

'High Speed Stirrer (Laboratory Model)'

(*Page 6, clauses A-2.3 and A-2.4*) - Add the word 'OR' between A-2.3 and A-2.4.

(*Page 7, clause A-3.2, line 5*) - Substitutue '(*see* A-2.3 *or* A-2.4)' *for* '(*see* A-2.3)'.

(*Page 7, clause A-3.3, line 2*) - Substitute (*see* A-1.3)' *for* '(*see* A-1.4)'.

(TDC 38)

Reprography Unit, ISI, New Delhi, India

Indian Standard

METHOD FOR EVALUATION OF STRENGTH AND SHADE OF PIGMENT DISPERSION BY PRINTING METHOD

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Indian Standard

METHOD FOR EVALUATION OF STRENGTH AND SHADE OF PIGMENT DISPERSION BY PRINTING METHOD

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 12 December 1981, after the draft finalized by the Dyestuffs Sectional Committee had been approved by the Textile Division Council

0.2 The pigments for textile printing are marketed in the form of a Dispersion/Suspension of a finelly divided pigment in water. The pigment content of such dispersion may vary from product to product.

0.3 Standards of Weights and Measures Act, 1976 stipulates the use of International System of Units in the country; in order to familiarize the industry with this system, the recommended SI units for use in the textile industry are given in Appendix B.

0.4 In reporting the results of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS : 2-1960*.

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1. SCOPE

1.1 This standard prescribes a method for determination of strength and shade of a pigment dispersion by printing.

2. SAMPLING

2.1 Lot — All the containers of the same pigment dispersion and of the same concentration delivered to a buyer against a despatch note/delivery challan shall constitute a lot.

*Rules for rounding off numerial values (*revised*)

2.2 Unless otherwise agreed between the buyer and the seller the number of containers to be selected at random from a lot shall be as given below:

Lot Size	*Sample Size*
2 to 15	2
16 to 25	3
26 to 50	4
51 to 100	5
101 to 150	6
151 to 300	7
301 and above	8

2.3 It is very important that the contents of each container should be stirred thoroughly for not less than five minutes with a clean stick before sampling. The stirring should be prolonged particularly if settling of the pigment has taken place at the bottom of the container and this can be felt by probing with the stick. After ensuring that the contents in the container are completely homogenised, draw a sample of about 50 g in a clean bottle which should be corked or closed immediately after filling. This shall constitute the test sample This test sample should be stirred again with a clean glass rod just before weighing for the preparation of printing paste (*see* Note 2 under **A-4.3**).

3. STANDARD DYESTUFF

3.1 The standard sample of pigment dispersion against which the strength and shade of pigment dispersion under test is evaluated, shall be as agreed between the buyer and the seller.

4. QUALITY OF REAGENTS

4.1 Unless specified otherwise, pure chemicals shall be employed in the test and distilled water shall be used where use of water as a reagent is intended.

NOTE — ' Pure Chemicals ' shall mean chemicals that do not contain impurities which affect the experimental results

5. EVALUATION OF STRENGTH AND SHADE

5.1 Prepare a printing paste of a recommended percentage of a standard pigment dispersion (*see* **3.1**) by following exactly the procedure given in Appendix A. Prepare simultaneously a printing paste of the test sample of pigment dispersion using the same percentage as in the printing paste with the standard as also percentages varying by 5 and 10 percent on either of the recommended percentage.

5.2 Print the printing pastes of the standard and the test sample and also 5 and 10 percent variation prints side by side by machine or screen on a cotton cloth (*see* Appendix A) and then dry and fix the prints as detailed out in Appendix A. Immediately after printing, give identification marks to the prints After fixing the prints, iron the printed cloth on the reverse before evaluating the strength and shade

5.3 Make 1·3 reductions of the above printing pastes by using reduction thickening (*see* Appendix A) and print them against 1:3 reduction paste of the standard Then dry and fix as in **5.1** and **5.2**

5.4 Compare carefully the above set of prints (after ironing on the reverse) and determine by visual observation, which of the sample print tallies with the standard print Also find out the variation in shade if any from the standard shade

NOTE — The strength of the sample should be expressed on the comparisons of printings obtained as in **5.1** and **5.2** The variation in shade should be reported on reduction printings obtained as in **5.3**

5.5 Calculate the pigment under test by comparing the printings by the following formula:

$$S = \frac{A}{B} \times 100$$

where

S = strength of pigment in percent,
A = depth of printing of the standard pigment, and
B = depth of printing of the pigment under test comparing with that of standard

6. REPORT

6.1 Report the value obtained as in **5.5** as the strength in percent of the pigment under test as compared to the standard.

6.1.1 Report also the variation in shade in comparison with the shade of the standard.

APPENDIX A

(*Clauses* 5.1, 5.2, *and* 5.3)

METHOD FOR PIGMENT PRINTING

A-1. APPARATUS

A-1.1 Balance — Capable of weighing accurately up to 1 mg.

A-1.2 Weighing Scale — Capacity up to 2·5 kg and capable of weighing accurately up to 1 gram.

A-1.3 Glass Containers or Beakers — Capacity 200 ml and capable to withstand high stirring.

A-1.4 High Speed Stirrer Speed (Laboratory Model) — Speed 2000 - 3000 rpm with speed regulator, spindle and agitator blades.

A-1.5 Electric Oven — with an outlet for exhaust gases and heating range up to 160°C.

A-1.6 Electric Iron — One.

A-1.7 A Laboratory Sample Printing Machine — with a roller engraved to give vertical stripes when printed. (The width of the stripes should be minimum 1·25 cm and the stripes should be not less than 1·25 cm apart.)

A-1.8 A screen printing table together with a screen and squeegee to give stripe design as in **A-1.7**.

A-2. PRINTING AUXILIARIES

A-2.1 Binder for Pigment Printing — A synthetic resin based on an acrylic copolymer emulsion of the oil in water type. A binder with non-volatile matter content of 30 ± 2 percent should be used.

A-2.2 Soluble Thickening — Carboxy methyl cellulose, preferably of low viscosity giving practically colourless thickening with good flow property and neutral *p*H.

A-2.3 Mineral Turpentine-Solvent — 125/240 (*see* IS : 1745-1966*).

A-2.4 Kerosene — (*see* IS : 1459-1974†)

A-2.5 Diammonium Phosphate Solution — prepared by dissolving diammonium phosphate (*see* IS : 6448-1971‡) in water in the proportion 1 : 3 by mass.

A-2.6 Urea — Technical grade (*see* IS : 1781-1975§).

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*Petroleum hydrocarbon solvents (*first revision*)
†Kerosines (*second revision*)
‡Diammonium phosphate.
§ Urea, technical (*first revision*)

A-2.7 Cotton Fabric — The cotton cloth for the printing test should be unmercerized poplin. It shall be fully desized, scoured, bleached and soured. The *p*H of the cloth ready for pigment printing should be neutral or slightly acidic and never alkaline. It shall not be resin finished and shall not be treated with optical whitening agent.

A-3. Procedure

A-3.1 Preparation of Soluble Thickening — Prepare 5 percent thickening by weighing 5 g of carboxy methyl cellulose powder (*see* **A-2.2**) accurately and, gradually sprinkle it over 95 ml of cold water with constant stirring. Allow it to soak overnight This should be sieved through a fine mesh cloth before use.

A-3.2 Preparation of 10 Percent Stock Thickening (Emulsion) — Weigh in a stainless steel or plastic container (capacity about 2 kg) 100 g binder (*see* **A-2.1**) and 100 ml water. Then add to this 50 g soluble thickening (*see* **A-3.1**) and 20 g urea. Mix the ingredients under high speed stirrer with gradual addition of 730 g mineral turpentine or kerosene (*see* **A-2.3**) and continue stirring till a homogenous emulsion thickening is obtained. The total mass of the components of mixture shall be 1 000 g.

A-3.3 Preparation of a Printing Paste — Weigh accurately in a glass container or beaker (*see* **A-1.4**), 4 g pigment dispersion (*see* Notes 1 and 2). Then place the beaker containing the pigment dispersion on a weighing scale together with a glass rod for mixing purpose and counterpoised. Add 89 g of 10 percent stock thickening (*see* **A-3.2**) followed by 3 g binder [extra addition to adjust the ratio of colour: binder 1:3 (*see* Note 3)] and mix the whole mixture thoroughly. Add 4 g diammonium phosphate solution. Stir under a high speed stirrer for about 30 to 60 seconds. The paste is then ready for printing. The total mass of ingredients shall be 100 g.

NOTE 1 — Normally 4 percent shade for printing shall be used For black pigments it is necessary to have deeper shade and 6 to 8 percent of pigment is taken in preparing of printing paste.

NOTE 2 — Some pigment dispersions on long storage show separation due to settling. Hence all pigment dispersions must be thoroughly stirred before sampling as well as before weighing.

NOTE 3 — The strength of a pigment print also depends among other factors, on the quantity of binder used Therefore, to get a maximum strength a colour to binder ratio of 1 3 should be maintained and also a minimum of 10 percent binder in 100 parts of printing paste

A-3.4 Preparation of Reduction Printing Paste — To make 1:3 reduction printing paste, weigh in a glass container or a beaker, 25 g printing paste (*see* **A-3.3**) and add to it 75 g of 10 percent stock thickening (*see* **A.3.2**) containing 0·5 ml diammonium phosphate solution and mix

initially whole mixture with a glass rod and thereafter stir it for about 60 seconds under a high speed stirrer.

NOTE — For black pigments the reduction paste should contain 0·5 to 1·0 per cent of the pigment

A-3.5 Printing — The printing pastes prepared with the sample and standard in the manner described in **A-3.3** and **A-3.4** are printed side by side in full shade and reduction on plain white cotton cloth pieces (*see* **2.7**) with a sample printing machine or a screen giving uniform and adequate pressure to get even prints. Excessive pressure should be avoided.

NOTE — If the screen printing is used, the concentration of the pigment should be reduced by 25 percent than that of the concentration used in roller printing.

A-3.6 Drying — The printed cloth pieces are evenly dried at a temperature of about 80°C in an oven (*see* **A-1.5**) till such time that the dried prints do not retain any trace of mineral turpentine or kerosene.

A-3.7 Fixing (Curing) — The dried prints are fixed by curing the prints at a temperature of 140°C for 5 minutes. The prints should not smell of kerosene/mineral turpentine when they are ready for curing. Over-curing should be avoided since in certain cases it causes a dullening of the prints.

APPENDIX B
(*Clause* 0.3)

RECOMMENDED SI UNITS FOR TEXTILES

Sl No.	Characteristic	SI Unit(s)		Application
		Unit(s)	Abbreviation	
(1)	(2)	(3)	(4)	(5)
1	Length	Millimetre	mm	Fibres
		Millimetre, centimetre	mm, cm	Samples, test specimens (as appropriate)
		Metre	m	Yarns, ropes, cordage, fabrics
2.	Width	Millimetre	mm	Narrow fabrics
		Centimetre	cm	Other fabrics
		Millimetre, centimetre	mm, cm	Samples, test specimens (as appropriate)
				Carpets, druggets, *Durries* (as appropriate)
3.	Thickness	Micrometre (micron)	μm	Delicate fabrics
		Millimetre	mm	Other fabrics, carpets, felts
4.	Linear density	Tex	tex	Yarns
		Millitex	mtex	Fibres
		Decitex	dtex	Filaments, filament yarns
		Kilotex	ktex	Slivers, ropes, cordage
5.	Diameter	Micrometre (micron)	μm	Fibres
		Millimetre	mm	Yarns, ropes, cordages
6	Circumference	Millimetre	mm	Ropes, cordage
7.	Threads in fabric			Woven fabrics (as appropriate)
	a) Lengthwise	Number per centimetre	ends/cm	
		Number per decimetre	ends/dm	
	b) Widthwise	Number per centimetre	picks/cm	
		Number per decimetre	picks/dm	
8.	Warp threads in loom	Number per centimetre	ends/cm	Reeds

RECOMMENDED SI UNITS FOR TEXTILES

Sl No.	Characteristic	SI Unit(s)		Application
		Unit(s)	Abbreviation	
(1)	(2)	(3)	(4)	(5)
9.	Stitches in knitted fabric			Knitted fabrics (as appropriate)
	a) Lengthwise	Courses per centimetre Courses per decimetre	courses/cm courses/dm	
	b) Widthwise	Wales per centimetre Wales per decimetre	wales/cm wales/dm	
10.	Stitch length	Millimetre	mm	Knitted fabrics, made-up items
11.	Mass per unit area	Grams per square metre	g/m^2	Fabrics
12.	Mass per unit length	Grams per metre	g/m	Fabrics
13.	Twist	Turns per centimetre Turns per metre	turns/cm turns/m	Yarns, ropes, cordage (as appropriate)
14.	Test or gauge length	Millimetre, centimetre	mm, cm	Fibre, yarn and fabric specimens (as appropriate)
15.	Breaking load	Millinewton	mN	Fibres, delicate yarns (individual or skeins)
		Newton	N	Strong yarns (individual or skeins) ropes, cordage, fabrics
16	Breaking length	Kilometre	km	Yarns
17.	Tenacity	Millinewton per tex	mN/tex	Fibres, yarns (individual or skeins)
18.	Twist factor or twist multiplier	Turns per centimetre × square root of tex Turns per metre × square root of tex	turns/cm × $\sqrt{\text{tex}}$ turns/m × $\sqrt{\text{tex}}$	Yarns (as appropriate)
19	Bursting strength	Newton per square centimetre	N/cm^2	Fabrics
20.	Tear strength	Millinewton, newton	mN, N	Fabrics (as appropriate)
21.	Pile height	Millimetre	mm	Carpets
22.	Pile density	Mass of pile yarn in grams per square metre per millimetre pile height	g/m^2/ mm pile height	Pile carpets
23.	Elastic modulus	Millinewton per tex per unit deformation	mN/tex/unit deformation	Fibres, yarns, strands

INDIAN STANDARDS

ON

DYESTUFFS

IS :

3859-1966 Method for determination of strength of water soluble azo dyes by reduction with titanium trichloride
4360-1967 Method for determination of strength of fast bases
4394-1967 Method for evaluating strength of homogeneous vat dyestuffs
4459-1967 Method for determination of strength of direct dyestuffs by dyeing test
4472 (Part I)-1967 Methods for identification of the application classes of dyes on textile materials Part I Cotton and other cellulosic fibres
4472 (Part II)-1968 Methods for identification of application classes of dyes on textile materials Part II Wool, silk and other protein fibres
4172 (Part III)-1973 Methods for identification of application classes of dyes on textile materials. Part III Man-made fibres
4946-1968 Method for evaluation of strength and shade of naphthol
5970-1970 Method for estimation of strength (vat content) of solubilized vat dyestuffs
6526-1971 Method for evaluation of strength and shade of fast bases by dyeing test
7447-1974 Method for evaluating strength of reactive dyes (dichlorotriazinyl type) by dyeing test
7448-1974 Method for evaluating strength of reactive dyes (monochlorotriazinyl type) by dyeing test
7842-1975 Method for evaluating strength of reactive dyes (vinyl sulphone type) by dyeing test
7843-1975 Method for evaluating strength and shade of acid dyes by dyeing test
7844-1975 Method for evaluating strength and shade of chrome dyes by dyeing test
7845-1975 Method for evaluating strength of reactive dyes (trichloropyrimidyl type) by dyeing test

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